

REMARKS

Applicants wish to interview the Examiner with respect to the presently pending application. Applicants' undersigned representative will contact the Examiner to arrange for an interview at a mutually agreeable time.

Applicants again respectfully request examination of the Formal Drawings, and that the Official Draftsperson include an initialed PTO-948 form with the next Communication from the Patent Office.

Claims 1-26 have been examined on their merits.

Applicants herein cancel claim 3 without prejudice and/or disclaimer.

Applicants herein add new claims 27. Support for new claim 27 can be found, for example, at page 2, lines 14-21 of the written disclosure. No new matter has been added. Entry and consideration of the new claim 27 is respectfully requested.

Applicants herein amend claims 2, 4, 21 and 22 in order to more clearly recite the subject matter claimed therein. Applicants submit that the amendments to claims 2, 4, 21 and 22 were made merely to more accurately claim the present invention and do not narrow the literal scope of the claims as originally filed. The amendments to claims 2, 4, 21 and 22 were not made for reasons of patentability.

Claims 1, 2 and 4-27 are all the claims pending in the application.

1. Claims 1, 2, 3, 5, 12-15 and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Takeshi (Japanese Patent No. Heisei 9-237867)(hereinafter JP '867). The rejection of claim 3 is now moot due to its cancellation. Applicants respectfully traverse the rejection of claims 1, 2, 5, 12-15 and 26 for at least the reasons set forth below.

JP '867 discloses, *inter alia*, a module comprised of an antenna element (3) and a high-frequency device (9). Several ground planes (5, 12) are interposed between the antenna element and the high-frequency device. The ground planes have slots (6, 13) that pierce their respective ground planes. See Fig. 1 of JP '897. The antenna element and the high-frequency device are coupled together through the ground plane slots via electromagnetic coupling. See English translation of JP '867, Detailed Description of the Invention, numbered paragraph 0014.

To support a conclusion that a claimed invention lacks novelty under 35 U.S.C. § 102, a single source must teach all of the elements of a claim. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379 (Fed. Cir. 1986). A single source must disclose all of the claimed elements arranged as in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

JP '867 does not teach or suggest, however, an integrated circuit package comprising a radio frequency antenna and an integrated circuit die, wherein the radio frequency antenna is directly connected by a wire to the integrated circuit die, as recited in claim 1. In fact, JP '867 teaches away from the present invention, since JP '867 teaches the use of electromagnetic coupling, instead of wiring, to route signals from the high-frequency device to the antenna element. No direct wiring connection between the high-frequency device and the antenna element is taught or suggested by

JP '867. See English translation of JP '867, Detailed Description of the Invention, numbered paragraph 0014. The drawings of JP '867 are consistent, e.g., Fig. 3 of JP '867 fails to a wire directly connected between the high-frequency device and the antenna element, as recited in claim 1. Instead, signal transmission between the high-frequency device and the antenna element is accomplished using electromagnetic coupling.

Based on the foregoing reasons, Applicants believe that JP '867 fails to disclose all of the claimed elements as arranged in claim 1. Therefore, under *Richardson*, JP '867 clearly cannot anticipate the present invention as recited in independent claim 1. Thus, Applicants believe that claim 1 is in condition for allowance, and further believe that claims 2, 5, 11 and 12 are allowable as well, at least by virtue of their dependency from claim 1. Applicants respectfully request that the Examiner withdraw the § 102(b) rejection of claims 1, 2, 5, 11 and 12.

Independent claim 13 has similar recitations as claim 1, and Applicants believes that claim 13 is allowable for at least the same reasons as claim 1. Applicants further believe that claims 14, 15 and 26 are allowable as well, at least by virtue of their dependency from claim 13. Applicants respectfully request that the Examiner withdraw the § 102(b) rejection of claims 13-15 and 26.

2. Claims 4, 9-11 and 21-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '867 in view of Masahito (Japanese Patent No. Heisei 8-250913)(hereinafter JP '913), Koichi (Japanese Patent No. Showa 63-1818505)(hereinafter JP '505), Moskowitz et al. (U.S. Patent No. 5,528,222), Houghton et al. (U.S. Patent No. 6,282,095) and Mussler (U.S. Patent No. 4,733,245).

Applicants respectfully traverse the rejection of claims 4, 9-11 and 21-25 for at least the reasons set forth below.

Claims 4 and 9-11 depend from claim 1, and therefore include all the recitations of claim 3 by virtue of their dependency from claim 1.

Applicant reminds the Examiner that the initial burden of establishing that a claimed invention is *prima facie* obvious rests on the USPTO. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). To make its *prima facie* case of obviousness, the USPTO must satisfy three requirements:

1. The prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated to artisan to modify a reference or to combine references. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988).
2. The proposed modification of the prior art must have had a reasonable expectation of success, and that determined from the vantage point of the artisan at the time the invention was made. *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1209 (Fed. Cir. 1991).
3. The prior art reference or combination of references must teach or suggest all the limitations of the claims. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991); *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970).

The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, the nature of a problem to be solved. *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). Alternatively, the motivation may be implicit from the prior art as a whole, rather than expressly stated. *Id.* Regardless if the USPTO relies on an

express or an implicit showing of motivation, the USPTO is obligated to provide particular findings related to its conclusion, and those findings must be clear and particular. *Id.* A broad conclusionary statement, standing alone without support, is not “evidence.” *Id.*; *see also, In re Zurko*, 258 F.3d 1379, 1386 (Fed. Cir. 2001).

In addition, a rejection cannot be predicated on the mere identification of individual components of claimed limitations. *In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000). Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. *Id.*

The Examiner acknowledges that JP ‘867 fails to teach or suggest a radio frequency antenna disposed on a metal frame of a packaged integrated circuit, and further, JP ‘867 fails to teach or suggest the use of a Ball Grid Array, a Quad Flat Pack or a Small Outline package. *See* page 3 of the Office Action dated December 19, 2001.

JP ‘913 discloses, *inter alia*, a MMIC package comprising an antenna (203) and an amplifying circuit (202) enclosed in a cavity in a case (204). The case has metal lining the cavity enclosing the antenna and amplifying circuit. *See* Fig. 13 of JP ‘913.

JP ‘505 discloses, *inter alia*, a S-shaped slot antenna having a cavity resonator. *See* Abstract of JP ‘505.

Houghton et al. discloses, *inter alia*, several types of connectors, such as Ball Grid Arrays, for electrically connecting integrated circuits to printed circuit wiring. *See* col. 5, lines 11-23 of Houghton et al.

Mussler discloses, *inter alia*, a cavity backed slot antenna. *See* Fig. 1 of Mussler.

Moskowitz et al. discloses, *inter alia*, conventional packaging techniques. *See* Figs. 1A and 1B of Moskowitz et al.

However, the combination of JP '867, JP '913, JP '505, Houghton et al. and Mussler fails to teach or suggest an integrated circuit package comprising a radio frequency antenna and an integrated circuit die, wherein the integrated circuit die is shielded from the radio frequency antenna, and the radio frequency antenna is coupled by a wire to the integrated circuit die, as recited in claim 3. As discussed above, the primary reference JP '867 does not teach or suggest several features of the present invention, and actually teaches away from the invention recited in claim 3 and included in claims 4 and 6-11. None of the secondary references overcome the deficiencies of the primary reference JP '867. JP '913 discloses an antenna and an amplifying circuit connected together within the same enclosure (e.g., without shielding). JP '505 and Mussler disclose various slot-type antennas. Houghton et al. discloses various connection devices. However, each secondary reference fails to supply any teaching or suggestion that overcomes the deficiencies of the primary reference.

Thus, Applicants believe that claims 4, 9-11 and 21-25 are allowable over the combination of JP '867, JP '913, JP '505, Moskowitz et al., Houghton et al. and Mussler for at least the reasons discussed above.

3. Claims 6-8 and 16-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '867 in view of JP '505 and Yoshitaka (Japanese Patent No. Heisei 6-085530)(hereinafter JP '530). Applicants respectfully traverse the rejection of claims 6-8 and 16-18 for at least the reasons set forth below.

Claims 6-8 depend from claim 1, and therefore include all the recitations of claim 1 by virtue of their dependency from claim 1.

JP '530 discloses, *inter alia*, a diagonally shaped microstrip antenna arranged on a dielectric layer.

However, the combination of JP '867, JP '505 and JP '530 fails to teach or suggest an integrated circuit package comprising a radio frequency antenna and an integrated circuit die, wherein the radio frequency antenna is directly connected by a wire to the integrated circuit die, as recited in claim 1 and included in claims 6-8. As discussed above, the primary reference JP '867 does not teach or suggest several features of the present invention, and actually teaches away from the invention recited in claim 1. None of the secondary references overcome the deficiencies of the primary reference JP '867. JP '913 discloses an antenna and an amplifying circuit connected together within the same enclosure (e.g., without shielding). JP '530 discloses a microstrip antenna without any additional teaching of directly connecting the antenna to an integrated circuit die. Thus, Applicants believe that that the "all limitations" prong of a *prima facie* case of obviousness has not been satisfied, since each secondary reference fails to supply any teaching or suggestion that overcomes the deficiencies of the primary reference.

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No. 09/784,015
ATTORNEY DOCKET NO. Q62388

Based on the foregoing reasons, Applicants believe that the combination of JP '867, JP '505 and JP '520 fails to disclose all of the claimed elements as arranged in claims 6-8. Thus, Applicants believe that claims 6-8 are condition for allowance, and Applicants respectfully request that the Examiner withdraw the § 103(a) rejection of claims 6-8.

Claims 16-20 depend from claim 1, and therefore include all the recitations of claim 13 by virtue of their dependency from claim 13.

The combination of JP '867, JP '505 and JP '530 fails to teach or suggest an integrated circuit package comprising a radio frequency antenna and an integrated circuit die, wherein the radio frequency antenna is directly connected by a wire to the integrated circuit die, as recited in claim 13 and included in claims 16-20. As discussed above, the primary reference JP '867 does not teach or suggest several features of the present invention, and actually teaches away from the invention recited in claim 13 for the same reasons as discussed above with respect to claim 1.

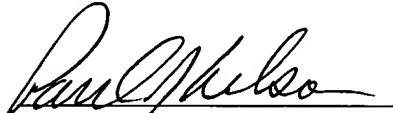
Thus, Applicants believes that claims 16-20 are allowable for at least the same reasons as claims 6-8. Applicants respectfully request that the Examiner withdraw the 103(a) rejection of claims 16-20.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No. 09/784,015
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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Paul J. Wilson
Registration No. 45,879

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: October 16, 2002

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 1, cancel the fourth full paragraph.

Page 2, cancel the first, third and fifth full paragraphs.

Page 2, fourth full paragraph:

In both alternative embodiments a metal object within the package is used for implementing the radio frequency antenna. In one embodiment, [At first, in claim 3,] the Integrated radio frequency antenna is constituted by a wire bonding coupling for example an output of the Integrated Circuit die to an output terminal. This is feasible if the length of a wire bonding is $\frac{1}{2}\lambda$ or $\frac{1}{4}\lambda$ of the [targeted,] to be received or transmitted radio signal wavelength. As [Secondly, in claim 4, as] an alternative embodiment, a metal lead-frame inside the Integrated Circuit package is used as a radio frequency antenna.

Page 3, cancel the first, third and fifth full paragraphs.

Page 4, cancel the first full paragraph.

IN THE CLAIMS:

Claim 3 is canceled without prejudice and/or disclaimer.

The claims are amended as follows:

1. (*Twice Amended*) A packaged integrated circuit, comprising at least one radio frequency component included in an integrated circuit die directly connected by wire to [being associated with] a radio frequency antenna, said integrated circuit die being included in said packaged integrated circuit, wherein said radio frequency antenna comprises a portion of the package of said packaged integrated circuit and is excluded from said integrated circuit die.

~~3. *Cancelled*~~

2. (*Twice Amended*) The packaged integrated circuit according to claim 1, wherein said packaged integrated circuit comprises an integrated circuit package which houses said at least one radio frequency component and wherein said radio frequency antenna [which] comprises at least one metal object that is a portion of the package of said packaged integrated circuit.

4. (*Twice Amended*) The packaged integrated circuit according to claim 2, wherein said radio frequency antenna is disposed on a metal [lead] frame of said integrated circuit package.

13. (*Amended*) A module, comprising:
an integrated circuit die having at least one radio frequency component;
a radio frequency antenna;
a shield interposed between said integrated circuit die and said radio frequency antenna,
wherein said integrated circuit is directly connected to said radio frequency antenna by metal wiring routed through said shield.

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No. 09/784,015
ATTORNEY DOCKET NO. Q62388

20. (*Amended*) The module according to claim 19 [13], wherein two of said plurality of via holes are disposed opposite each other on said periphery of said antenna [said radio frequency antenna is differentially excited].

21. (*Amended*) The module according to claim 13, further comprising an integrated circuit package having a metal [lead] frame, said integrated circuit package encapsulating said shield and said integrated circuit die.

22. (*Amended*) The module according to 21, wherein said radio frequency antenna is disposed on said metal [lead] frame of said integrated circuit package.

Claim 27 is added as a new claim.